MINING THROUGH THE NATIONAL SECURITY LENS

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About the Authors
Mining is a volatile industry in the Philippines notwithstanding its potential importance to the country’s industrialization and development. Due in part to longstanding debates on its environmental impact and contributions to tax revenues, as well as issues with existing mining laws, mining has become a divisive issue and has failed to contribute more significantly to the country’s economy. This study examines the Philippine mining industry in the context of promoting national security through industrialization. It examines how mining could be part of a robust value chain—going beyond the present view that it is simply a source of tax revenues. Using this national security and industrial policy lens emphasizes the potentially important role of mining in boosting the Philippines’ sustained economic development. This is even more critical when one considers that China—a country which has a simmering territorial dispute with the Philippines—already supplies the lion’s share of the country’s steel. This is a trend that could be reinforced further by China’s effort to promote its Belt and Road Initiative and the Philippines’ effort to ramp up its infrastructure investments through the Duterte administration’s Build-Build-Build program. Given the PhP 8.44 trillion planned government infrastructure package to be spent up to 2022, imported steel could increase by around ten times (1018%) as much as the annual 2016 levels. This will be the result of an estimated increase in steel shipments from 6.5 million metric tons in 2016 to 73 million metric tons in total for all public infrastructure projects under Duterte’s centerpiece economic program.

At such rate, the Philippines would have to rely on potentially very large Chinese steel imports for its program - a scenario that brings with it major economic and political vulnerabilities. In its own national security interest, the Philippines should consider pursuing mining downstream industry development, where, historically, the usual problems of high costs from power to business and bureaucratic inconsistencies, have proven to be a challenge.

Yet, these are the very same challenges that the country is expected to overcome with reforms and its impending industrialization push which has already commenced.

The study showed that there still exist opportunities for the Philippines to cultivate these areas and benefit from its natural resources. Selecting key industries, such as shipbuilding, where it has most advantage on in terms of economic benefits and costs, will be beneficial for the economy. Public and private support given to these areas will go a long way creating high value-added products and services. Exploration of new territories, research and development could also assist in cultivating the country’s maritime industry. In the long term, opportunities for developing key Philippine industries remain high despite the challenges.
Much has been said about the Philippines’ natural resources and how they can assist economic development, yet little has actually been done to develop them. Part of the reason has been the contentious nature of mining in the Philippines—a developing country exposed to the effects of climate change. Mining companies are often at loggerheads with environmentalists who fear extraction of minerals results in irreversible damage to nature, which, apart from disruptive impacts to biodiversity and livelihoods, can also make natural calamities like typhoons more deadly. Damage to forest, freshwater, and agricultural resources can indeed happen when mining is done irresponsibly and the destruction can be pronounced and irreversible (Lindon et. al., 2013). Weaknesses in resource management, questions on fair share of mining revenues, and high business costs have also made the country’s mining sector less attractive to investors, despite its richness in mineral wealth and the potential of the mining industry.

The Philippines has every reason to explore its untapped mineral potential for development purposes. Industrialized countries like Australia, Canada, and the US have all utilized mineral resources to develop their industrial sectors, finance infrastructure development and build up public savings and sovereign wealth funds to ensure that succeeding generations also benefit from mineral revenues. In 2012, the Department of Environment and Natural Resources (DENR) estimated that
the country’s untapped mineral wealth amounted to USD 840 billion composed of 21.5 billion metric tons of metallic and 19.3 billion metric tons of non-metallic minerals (Chavez, 2012). Despite this, the mining sector’s contribution to gross domestic product (GDP) has fluctuated between only 1% and 2%, for the past two decades. Largely due to policy uncertainty, mining has gone through stop-and-go phases of development. The industry’s potential to promote economic growth and generate jobs and livelihood has been repeatedly studied (Arcilla 2017; Bocoum-Kaberuka, 1999; Israel, 2010; Erhun, 2015), but consistent policy action and sustained consensus have been elusive.

With arguments caught between appeals for economic development and the public’s safety from environmental hazards, a middle ground on mining is yet to be achieved. In this context, this paper tries to present national security as a possible common agenda in mining policy. For one, the country’s long-standing territorial disputes in the South China Sea with China are rooted partly on natural resources that islands such as the Reed Bank and Scarborough Shoal are believed to possess (GMA News Online, 2015; De la Paz, 2016). Likewise, unquantifiable mineral resources are crucial to Philippine industrial policy initiatives begun under the administration of Benigno Aquino III and sustained by President Rodrigo Duterte’s government (Department of Finance, 2017). While many say resources in South China Sea can help reinforce Philippine economic progress, territorial disputes with China have prevented the exploration and development of these resources just as Manila continues to rely on Beijing for processed materials such as steel and copper for industrialization purposes.

This study examines the Philippine mining industry in the context of promoting national security through industrialization. It develops evidence to support the argument that mining should be part of a robust value chain and should not just be seen simply as a source of tax revenues. Using these national security and industrial policy lens emphasizes the potentially critical role of mining in sustaining the Philippines’ industrialization and development.

The rest of the paper is arranged as follows. The second section reviews industrialization in other countries and draws on these experiences to analyze why it has been less successful in the Philippines. Section 3 then delves into the implications of present China-Philippine relations on the Duterte administration’s infrastructure agenda. The study presents initial calculations to project the
potential expansion in steel trade between China and the Philippines. This signals the Philippines’ possible risk of growing dependence on Chinese steel. Finally, Section 4 examines the economic viability of developing downstream mineral processing industries in the Philippines. A final section concludes with brief policy implications and recommendations.

Literature Review

Natural Resources and Industrialization in Other Countries

No less than the Mines and Geosciences Bureau (MGB), the agency tasked to protect and develop the country’s mineral resources, has underscored the need for a vibrant mining sector to ensure that the Philippines’ strong growth performance continues in the years ahead. As phrased by an MGB position paper on developing the domestic mineral processing industry, “To maintain the trajectory for economic development of the country, it could not be overemphasized that mining, minerals and metals industry would need to play a very important role in the country’s industrialization as experienced in most of the developed countries such as Japan, South Korea and Taiwan” (Mines and Geosciences Bureau, 2017, p. 5).

Citing the experiences of Japan, South Korea and Taiwan is not without basis. The so-called developmental states of the 1960s are cited for their success in industrialization and were considered the “tiger economies” of their time. Korea, for instance, developed its mining and manufacturing sector, moving from producing textiles, garments and plywood to heavy industries such as petrochemicals. From the 1960s to 1980s, the share of mining and manufacturing to the total economy rose to 30% from 18% (Kim, 1991). Since manufacturing is labor intensive, Korea's investments in the sector helped decrease its poverty rate to 5.1% in 1987 from 40.9% in 1965. Japan had a similar experience, where the Ministry of International Trade and Industry extended subsidies to priority firms, protected them from foreign competition and kept them afloat at times of economic distress (Ohno, 2006).

The government also directed state resources to support private sector initiatives consistent with its development program (Weiss, 2000; Dal, 2010). Mining is also an
economic development engine for countries like Australia and Canada. The industry accounts for 8.5% of Australian GDP and employs around 235,000 individuals, most of whom are high-skilled (Australian Department of Employment, 2017). Canada, meanwhile, is the fourth largest crude oil producer and fifth for natural gas. This did not only create jobs, but also ensured energy security even at a time when the country was already investing heavily on renewable resources.2

It is critically important to note here that the role of mining in these industrialized economies evolved over time (Kim, 1991). During the early phase, mining and processing played a crucial role in supplying materials for manufacturing and construction, fueling the industrial push. Much later in their development evolution, some countries such as Australia and South Korea have scaled down mining and processing activities, in favor of importation. This typically coincided with increased access to technology and competitiveness at much higher layers of the upstream (e.g. R&D and design) and downstream industries (e.g. marketing).

Resource-driven economies have risen in number over the past two decades, yet not all of them have been successful in maximizing their potential to drive growth and economic prosperity. Dobbs et. al. (2013) found that in 2011, there were 81 countries reliant on natural resources for economic growth, up from 58 in 1995. Their share of global output also rose to 26% from 18% during the same period, partially owing to a rise in resource prices and production and processing innovations. Yet many of these economies are low-income countries with per capita GDP of USD1,025 affected by the resource curse where governments are unable to utilize resources for development due to weak governance and institutions, a high degree of rent-seeking, and bureaucratic inefficiency (NRGI, 2015). Indeed, as a number of studies, such as by Sachs & Warner (1995; 2001), have empirically confirmed, resource-abundant developing countries have tended to have much weaker and fragile records of economic performance throughout the post-war period relative to resource-poor countries. Crisis-stricken Venezuela is a vivid example. The oil-rich country currently suffers from hyperinflation after inefficient management of its oil reserves as well as plummeting global oil prices that hit its major revenue source. Since 2015, this has fueled massive public unrest, and growing economic and political turmoil.

In Southeast Asia, Indonesia remains a lower-middle income economy despite being the world’s second largest nickel producer after the Philippines as of 2017.
Mining accounts for 4% of its GDP (much larger than the Philippines’ 1-2%), while industry revenues corner a third of the Indonesian budget every year. In 2014, the economic impact of its mineral resources was felt when the government banned the export of unprocessed minerals as a means to encourage miners to build processing plants and develop the local industry. Driven in part by plunging government revenues and widening budget deficit, the government relaxed the policy in January 2017 by allowing export permits of up to five years and shipments under government-defined volumes (Asmarini & Munthe, 2017).

There is a critically important distinction to be made between resource-rich and resource-dependent countries, as the latter typically experience “Dutch Disease” and other related economic effects that skew the economy away from manufacturing and other upstream and downstream industries with higher value added. Comprehensive surveys of country experience and empirical evidence in the mining industry reveal that among the more successful countries tapping mining are those with relatively stronger institutions for governing mining extraction and wealth management, and those with more effective industrial policy to better form upstream and downstream industries in their value chains. Because of the complex and often good governance-intensive collective action required to manage this transition, it is less surprising that only a few countries have managed to succeed here. Countries with already weak institutions often slide into even poorer development outcomes with mining and natural resource wealth characterized as the “devil’s excrement” rather than “manna from heaven” (MacArthur et al, 2015).

Industrialization Challenge in the Philippines

Environmental concerns over damage from mining, poor production facilities and political controversies concerning revenue sharing have stifled the growth of the mining industry, resulting in little mining GDP contribution of between 1% and 2% over the past 40 years (Lindon, et. al., 2013; Ciencia, 2006; Mendoza & Canare, 2013). As a result, the mining sector has failed to realize its full potential contribution to the Philippine industrialization process. To be sure, the Philippine mining sector provides raw materials to 8 out of 11 local industries, the most pronounced
of which are found in manufacturing, electricity, gas and water supply as well as construction activities (Philippine Statistics Authority, 2014). In fact, according to government estimates, for every 1% manufacturing output, 0.05989% of that come from mining inputs. Each 1% of construction output also relies on 0.01388% of mining raw materials and supplies. Yet, the Philippines’ mining output only fills 31% of the country’s annual demand (Philippine Statistics Authority, 2014). This highlights the Philippines’ dependency on imported materials, including that for its infrastructure needs.

Stable capital outlays are a key part of sustained industrialization efforts. Building resilient infrastructure that promotes industrialization and fosters innovation is among the United Nations (UN) Sustainable Development Goals. While importing capital inputs for industries is not necessarily problematic, the possibility of large debt accumulated as a result of the infrastructure programs, coupled with corruption-laden projects, raises deep concern among groups aware of China’s mixed track record combined with the Philippines’ recent history under the Marcos regime. Chinese projects are expected to be pushed by that country’s efforts to offload its surplus capacity, notably in the construction sector, while its own state-owned enterprises are expected to be influenced not only by commercial (i.e. economic feasibility) motivations. Indeed, even while recognizing that much variety exists in the effectiveness and orientation of different sources of Chinese investment (e.g. national/regional state enterprises, provincial entrepreneurs, private investors), analysts also underscore that Chinese geopolitical and foreign policy ambitions will be key factors driving these projects and the wider “one belt, one road” initiative as well (See Box 1). In addition, untapped natural resources in the Philippines are worth examining in view of making the economy more economically independent in terms of supplying mineral inputs to industrialization efforts. Sustainable use of resources to develop industries in this manner can help promote economic stability, a key component of national security.

As regards complicating factors, the Philippines, among a handful of ASEAN countries, remains in a territorial dispute with China, one of ASEAN’s main trading partners, over islands in South China Sea. While tensions have eased, at least for the Philippines, since President Duterte took office in June 2016, Chinese ships moving along Spratly Islands, including Reed Bank near Palawan, has heightened concerns that the Philippines may be giving in too much to China in exchange for
economic assistance that the Duterte government has reportedly secured for its PhP 8.4 trillion “Build, Build, Build” infrastructure agenda (De Vera, 2017; Padin, 2017).

**Box 1: China’s One Belt, One Road Initiative**

Launched in September 2013, the one belt, one road initiative— also called Belt and Road Initiative (BRI) — is China’s massive effort to fund infrastructure development across 70 countries in Central and Southeast Asia, Europe and Africa. It aims to spend around USD 1 trillion in capital outlays in developing countries from bridges, railway to toll roads.

China has branded BRI as part of its effort toward a more open economy and in pursuit of stronger economic relations among its neighbors, including ASEAN, some members of which, including the Philippines, are currently locked in territorial disputes with China (Xinhua, 2015). China has tried to lure countries toward BRI through its claims of respect to territorial integrity and sovereignty, non-interference in local affairs and mutual benefit between nations. Analysts however have a different view. Hancock (2017) argued that China’s BRI is “motivated by concerns about slowing domestic growth and a desire to boost China’s global influence.” Meltzer (2017), meanwhile, said China is using BRI to counter Western influence in Asia and become its own “dominant power.”

More than four years since its launch however, Chinese infrastructure projects in various nations have faced controversies. In Kenya, a USD 12-million bridge built by China collapsed just before it was completed (Duggan, 2017). In Vietnam, Hanoi’s first elevated railway funded by Beijing is suffering delays due to “poor quality materials, faulty installations and untrained workers” (Nikkei, 2017). On top of poor infrastructure quality, developing countries were also warned against taking costly loans from China that risk burdening them with debts and compromising their fiscal health in the long run (JP, 2017).

*Source: Authors’ synthesis based on various sources.*
government of Benigno Aquino III filed and won an arbitration case in 2016. It was only after Duterte took a softer approach to China in exchange for economic assistance that the ban was lifted in October 2016 (Simeon, 2016).

China and Philippine Industrialization

Philippine-China Trade Relations

As of 2016, China was the Philippines’ top import source, and fourth largest export destination. Broken down, Beijing is both a vital source of industrial components, and market for the country’s raw materials.

Table 1. China Industrial Imports and Exports to the Philippines, 2016

<table>
<thead>
<tr>
<th>Imports</th>
<th>FOB Value (USD Million)</th>
<th>Rank</th>
<th>Share of total</th>
<th>Exports</th>
<th>FOB Value (USD Million)</th>
<th>Rank</th>
<th>Share of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>15,664.9</td>
<td>1st</td>
<td>18.5%</td>
<td>TOTAL</td>
<td>6,372.62</td>
<td>4th</td>
<td>11.1%</td>
</tr>
<tr>
<td>Electronic Products</td>
<td>3,299.17</td>
<td>1st</td>
<td>14.8%</td>
<td>Electronic Products</td>
<td>3,804.60</td>
<td>2nd</td>
<td>12.9%</td>
</tr>
<tr>
<td>Iron and Steel</td>
<td>2,331.92</td>
<td>1st</td>
<td>70.2%</td>
<td>Other Manufactures</td>
<td>521.87</td>
<td>2nd</td>
<td>13.5%</td>
</tr>
<tr>
<td>Mineral Fuels, Lubricants and Related Materials</td>
<td>1,163.05</td>
<td>1st</td>
<td>14.6%</td>
<td>Other Mineral Products</td>
<td>496.40</td>
<td>1st</td>
<td>47.1%</td>
</tr>
<tr>
<td>Industrial Machinery</td>
<td>1,110.82</td>
<td>2nd</td>
<td>18.4%</td>
<td>Chemicals</td>
<td>291.58</td>
<td>1st</td>
<td>18.2%</td>
</tr>
<tr>
<td>Miscellaneous Manufactured Articles</td>
<td>984.42</td>
<td>1st</td>
<td>38.1%</td>
<td>Machinery &amp; Transport Equipment</td>
<td>6.6</td>
<td>3rd</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

Source: Philippine Statistics Authority (2017)

For Ronald Recidoro, executive director of industry group Chamber of Mines of the Philippines, China’s advantage in mineral processing lies with its large consumption base, cheap factory production and power costs (personal
communication, June 20, 2017). At the same time, in recent years, China’s own industrialization prompted it to source more nickel from the country to produce steel. Since 2006, China’s purchase of Philippine nickel ores has outstripped those of Australia and Japan, which have been major customers for the raw material since 1991. Nickel Asia (2016b), the country’s biggest nickel ore miner, reported that more than 60% of its output goes to China every year. Recidoro argued that in recent years, only China has demonstrated a strong demand for low-grade Philippine nickel since Japan mostly buys the high-grade (personal communication, June 20, 2017).

Due to the additional processing that they undergo, mineral exports to China return with more value to the Philippines. Significantly, some of these ores are imported back to the Philippines in the form of steel. The metal is a “basic industry prerequisite in a country’s pursuit of development and industrialization (Garcia & Vicente, 2005, p. 1).” While 30% of steel demand is supplied locally, Roberto Cola, president of the Philippine Steel and Iron Institute, argued that these are steel from scrap materials not viable for large-scale infrastructure projects (personal communication, June 27, 2017). The Philippines also does not produce its own stainless steel (Juancho Pablo Calvez, MGB’s chief metallurgist, personal communication, June 14, 2017). Instead, blast furnaces in the Philippines mainly process pig iron as a substitute for the absence of high-quality iron. Essentially, according to industry experts, the Philippines does not presently have an iron industry.

![Figure 1. Apparent Steel Consumption and Infrastructure Spending of the Philippines](image)

Source: SEAISI (2017). Department of Budget and Management
In 2016, Philippine steel consumption rose 11% year-on-year to 9.8 million metric tons (SEAISI, 2017). This followed five straight years of double-digit growth when government infrastructure spending accelerated (See Figure 1). Nearly 85% of consumption came from the construction sector (SEAISI, 2016). The sector helped propel the Philippine economy to an average GDP growth of 6.2% from 2011 to 2016, the fastest since the 1970s. During the same period, government infrastructure spending rose from 1.8% of GDP to 4.2%.

With the construction boom came a major increase in imports, raising the Philippines to the rank of the world’s 16th largest steel importer (International Trade Administration, 2017). Most shipments come from China, accounting for 79% of steel imports in 2016. Steel importations have been robust, hitting as much as 187% growth in 2015 as China (See Figure 2) continued to reduce excess capacity in its factories and begin to shift to a more service-oriented economy (Timmons & Huang, 2016). Growth in Chinese steel shipments outstripped that of the country’s entire steel imports (See Figure 3). Cheap prices were again the main contributing factor for the large shipments. In April 2017, the price of hot rolled coils used to make construction steel materials sold by China remains 30% below global average (MEPS International Ltd., 2017). Chinese steelmakers are believed to benefit from state subsidies in the form of cheap credit from state-owned banks as well as raw materials and land that allow them to lower their prices (Haley & Haley, 2013). As a result, prices of Chinese-supplied rebars, for instance, used for construction and manufacturing, were 15.3% below international prices as of April 2017 (MEPS International Ltd., 2017).

*Figure 2. Philippine Steel Imports from China*

![Graph showing Philippine steel imports from China from 1998 to 2018.](source: Philippine Statistics Authority)
Unlike our nickel ore export markets, which have diversified to include countries like Australia, South Korea, Greece and India, our steel imports have generally been concentrated in China, shifting from Japan in the middle of 1990s. This also shows industrial trade relations between the two countries have been resilient against the backdrop of growing geo-political stresses, and have even increased impressively during the tail-end of the Aquino administration.

Under Duterte, the Philippines is expected to be more reliant on China due to a foreign policy shift which the government characterizes as becoming more “independent.” The goal, officials said, is to diversify economic and political partnerships and tap other potential markets aside from the US. While the Duterte administration claimed to strengthen relations with other countries, including those in Southeast Asia, it is that of China that has gotten much attention both because of the extent and the potential risks it poses. Beijing has promised to finance billions of pesos worth of state infrastructure projects under the government’s “Build, Build, Build” infrastructure agenda worth PhP 8 trillion. However, most details on project deals have not been released publicly. What has been reported is that project loans granted by China would carry higher interest rates than other donors such as Japan (De Vera, 2017). With the amount of projects involved, the government’s infrastructure plans could inevitably lead to higher demand for industrial and processed mineral imports, potentially further increasing the country’s reliance on China.
Financing “Build, Build, Build” through China

The Duterte administration’s centerpiece economic program, “Build, Build, Build” expects to boost the country’s infrastructure to the tune of PhP 8.44 trillion between 2017 and 2022. Budget Secretary Benjamin Diokno said the amount could rise to as much as PhP 9 trillion, ushering in the “golden age of infrastructure” in the Philippines (DBM, 2017). Infrastructure investments will rise from 4.2% of GDP in 2016 to as much as 7.5% of GDP by 2022. To do this, the government would spend no less than PhP 1 trillion for infrastructure beginning 2018.

| Table 2. Duterte Government Estimated Infrastructure Spending Targets |
|-----------------|-------|-------|-------|-------|-------|
| 847.22 | 1,169.55 | 1,359.05 | 1,497.20 | 1,668.09 | 1,898.77 |
| % of GDP | 5.32% | 6.68% | 7.07% | 7.99% | 7.19% | 7.45% |

Source: National Economic and Development Authority

How the government will finance these projects is a cause of concern, primarily because of the unprecedented amount it would require. Many are worried that in building infrastructure, huge debts will be incurred burdening the economy similar to the Marcos era (De Lima, 2017). Of the total financing needs, 15% will reportedly be sourced from official development assistance (ODA), whether in grants or loans. But when broken down to consider only the 53 “flagship projects” worth PhP 1.6 trillion announced as of writing by the National Economic and Development Authority (NEDA), ODA’s share to total funding rises to 88.5%, whereas that allotted to public-private partnerships (PPP) shrinks to a negligible amount (See Figure 4). These projects include those which have been explicitly listed by NEDA as possessing “flagship” status and whose basic details, including estimated costs, funding source and construction schedule, were made public. This is a major departure from the previous government, where only 49.5% of actually-implemented NEDA Board-approved projects were under ODA while around 46% were accounted for by PPPs, which tap private sector funding and expertise (Mendoza and Cruz, 2017).

Of the total projected cost of Duterte’s flagship infrastructure projects, 10.4% have already been reported to be financed through Chinese ODA, though it is likely that this figure will increase in the future. This is a massive increase from virtually
none during the previous government so much so that Duterte’s first bilateral visit to Beijing in October 2016 was hailed as a turning point in Manila-Beijing bilateral relations. The government widely publicized the signing of 27 deals, covering both loans and investment pledges, collectively worth USD 21 billion during the trip joined by representatives from the business sector (Cardenas, 2017). Yet, most project details have yet to be released to the public, fueling concerns of impropriety with historical antecedents as far as China is concerned.

In 2006, the Arroyo administration’s planned USD 329 million National Broadband Network project with Chinese firm ZTE Corp. was shelved over bribery allegations that implicated even former President Arroyo herself. While she has since been cleared of charges, the experience has tainted China’s name in financing projects in the Philippines.

Duterte, who has vowed to fight corruption, has sought Chinese loans supposedly for its “non-interference” policy. Unlike the US or European nations that tie loans to conditionalities, China has a reputation for allegedly giving out loans with no strings attached (Condon, 2012). For Duterte, it serves a better deal than what Western institutions can offer with conditions like meeting governance and rule of law indicators for aid. Considering Western criticisms of his drug war that has claimed thousands of lives, Duterte rejected a USD 280 million aid from the European Union aimed at supporting peace-building efforts in Mindanao in May 2017 (Placido, 2017).
Aside from corruption issues, however, Mendoza & Cruz (2017) also cited financial risks attached to Chinese funds. International policy literature sheds further light on other “white elephant” projects involving Chinese financing and suppliers, finding that the implementation of such projects has oftentimes brought more costs than economic benefits in the wake of their implementation (Ansar et al, 2016). Crisis-stricken Venezuela, for example, engaged Chinese loans indexed to commodity prices. Instead of charging Venezuela at below-market interest rates similar to ODA from other countries, China demanded cheap oil in return, contributing to the country’s current economic woes.

In the Philippines, Cardenas (2017) found no financial records to support the capability of Chinese firms engaged by the government during Duterte’s visit. Aside from potentially softening the Philippines’ territorial claims, such irregularities in Chinese loans and investments raise national security concerns. They highlight risks in the government’s dealings with China by tapping its aid to finance Philippine industrialization. De facto, China may begin to develop some influence (direct or implicit) over the country’s industrial development trajectory, which also comprises a paramount national security concern. The extent of the two countries’ trade relations also meant that risks are not isolated to overleveraging or governance issues—critically covering long-term economic resilience and development as well.

Philippines’ Exposure to China in “Build, Build, Build”

There is no single definition of national security, yet in most cases, it is often synonymous with national defense (Lopez, 2013). During the Cold War, US commentator Walter Lippman defined national security in terms of conflict such that “a nation has security when it does not have to sacrifice its legitimate interests to avoid war, and is able, if challenged, to maintain them by war (Romm, 1993, p. 122).” Since then, however, national security has become more than a territorial issue and defense. For instance, national security may involve the economy and how it is protected from excessive foreign interference.

“National security concerns” are cited by the US Committee on Foreign Investment to review select foreign direct investments that enter the US (Tipler,
The goal is to ensure that foreign investors do not jeopardize US sovereignty through access to sensitive data or obtaining considerable control of an American business that may put the economy at risk. Indeed, security analysts have raised concerns over the fact that most of China’s telecommunications firms expanding abroad remain state owned enterprises or maintain strong ties with the Chinese government (Rogers & Ruppersberger, 2012). National security is now also connected to trade and natural resources. Australia’s national defense strategy includes respect for open trade counterbalanced by protecting the country’s borders against threats such as cybercrime and “illegal exploitation of our natural resources” (Australian Department of Defence, 2016, p. 141). These issues ring close to home for a country like the Philippines which has repeatedly experienced border intrusion by foreign ships (reputedly many from China) allegedly engaged in black sand mining and extraction of fisheries and other aquatic resources (Meruenas, 2013; Lagasca, 2014).

For the Duterte administration, national security is defined as “a state or condition wherein the people’s welfare, well-being, ways of life, government and its institutions, territorial integrity, sovereignty and core values are enhanced and protected (National Security Council, 2017, p. 2).” The breadth of approach encapsulated by this definition is captured by many elements, including socio-political stability, territorial integrity, ecological balance, cultural cohesiveness, moral-spiritual consensus and economic stability (Lopez, 2013), over which economic strength and resilience are underscored. Moreover, the Duterte administration recognized that the pursuit of national security is “in line with… the Filipinos’ Vision” under the long-term sustainable economic program, AmBisyon Natin 2040: “In 2040, we will all enjoy a stable and comfortable lifestyle, secure in the knowledge that we have enough for our daily needs and unexpected expenses, that we can plan and prepare for our own and our children’s future. Our family lives together in a place of our own, and we have the freedom to go where we desire, protected and enabled by a clean, efficient and fair government (National Security Council, 2017, p. 4).”

While economic managers have pledged that the government will not sacrifice fiscal prudence in exchange for its infrastructure plans (DBM, 2017), risks from the country’s reliance on China become even clearer when one analyzes the extent to which this reliance can develop. In this regard, using government data and figures
from the World Steel Association, we can begin to guesstimate the scale of exposure that may come from Chinese steel importations required by “Build, Build, Build”.

The demand for Chinese steel imports, measured by Philippine Statistics Authority (PSA) data in kilograms, can be estimated using four variables measuring the gross value of both public and private construction (constant 2000 pesos), domestic crude steel production (metric tons) and gross value-added in the manufacturing sector (constant 2000 pesos), selected on the basis of existing empirical evidence on the biggest domestic factors affecting the Philippine economy’s appetite for steel importation. Indeed, according to 2016 figures from the South East Asian Iron & Steel Institute (SEAISI), construction accounts for 84.7% of apparent steel consumption in the Philippines, while shipbuilding and machinery and industry of the manufacturing sector corner 8.8% and 3.8%, respectively (SEAISI, 2016).

In addition, local crude steel serves as raw material for finished products like steel longs and flats and their production performance may indicate an increase or decrease in Chinese appetite or affect the Philippines’ own steel production. In 2015, local production of finished steel products rose 16% to 5.6 million metric tons (SEAISI, 2017). Industry experts note that the country produces long products from scrap metals for manufacturing and machineries, but not steel flats.

<table>
<thead>
<tr>
<th>Table 3. Summary of Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Chinese Steel Imports (kg)</td>
</tr>
<tr>
<td>Domestic Crude Steel Production (metric tons)</td>
</tr>
<tr>
<td>Private Construction (constant 2000 pesos)</td>
</tr>
<tr>
<td>Public Construction (constant 2000 pesos)</td>
</tr>
<tr>
<td>Manufacturing (constant 2000 pesos)</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations
For the purpose of estimating the likely effects of the government’s infrastructure program on the Philippines’ importation to Chinese steel imports, we undertake an illustrative empirical regression model to highlight the possible linear trends.\textsuperscript{4} Data was sourced from the PSA and the World Steel Association, covering years from 1998 to 2016. (See Appendix A).\textsuperscript{5} Table 3 provides a summary of descriptive statistics of the variables included in the regression. Tables 4 and 5 contain the regression results and initial interpretations. It is important to emphasize that the results of the analysis should be taken as mostly illustrative, rather than predictive in purpose: more than an exact figure, it is the scale of resulting imports that we wish to draw attention to.

Results show that of the four, all indicators except for manufacturing displayed statistically-significant relationships with Chinese steel imports, and that the $R^2$ and adjusted -$R^2$ values of the regression are high at 0.9146 and 0.8902 respectively. Both public (B=20116.8) and private (B=13183.85) construction showed significant positive relationships with Chinese steel shipments, which coheres with what experts expect from the infrastructure expansion. Domestic crude production (B=-3126.28), meanwhile, exhibited a significant negative relationship with Chinese steel imports. Finally, the manufacturing industry showed a positive, but statistically insignificant relationship. It is worth noting that among the estimated coefficients in the regression, both public and private construction have the strongest relationship with Chinese steel imports. This is consistent with what existing literature shows concerning the propensity of steel use on the sector (SEAISI, 2016).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Crude Steel Production</td>
<td>-3126.49\textsuperscript{**}</td>
<td>654.2038</td>
</tr>
<tr>
<td>Private Construction</td>
<td>13183.85\textsuperscript{*}</td>
<td>5007.038</td>
</tr>
<tr>
<td>Public Construction</td>
<td>20116.8\textsuperscript{*}</td>
<td>6349.711</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>410.0/2/7</td>
<td>1789.424</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.61e+09</td>
<td>8.62e+08</td>
</tr>
</tbody>
</table>

Note: R-squared: 0.9146; Adjusted r-squared: 0.8902; **P < 0.001; *P < 0.01; *P < 0.05

Source: Authors’ calculations
Table 5. Interpreted Relationship of the Variables to Chinese Steel Imports

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Relationship</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Crude Steel Production</td>
<td>-3.1 metric tons per +1 metric ton</td>
<td>Significant (negative)</td>
</tr>
<tr>
<td>Private Construction</td>
<td>+13.2 metric tons per +1 constant million pesos</td>
<td>Significant (positive)</td>
</tr>
<tr>
<td>Public Construction</td>
<td>+20.1 metric tons per +1 constant million pesos</td>
<td>Significant (positive)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>+0.4 metric tons per +1 constant million pesos</td>
<td>Insignificant</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations

Table 5 presents the interpretations of resulting coefficients from the linear regression. In the public construction sector, it is estimated that an additional PhP 1 million worth of activity, in constant 2000 prices, tends to increase steel imports from China by an additional 20.1 metric tons. A smaller amount of increase was recorded for private construction: an extra PhP 1 million worth of additional activity, again expressed in constant prices, is likely to increase steel imports by 13.2 million metric tons. Indeed, this estimated relationship between public construction and Chinese steel imports was strongly demonstrated from 2011 to 2016. During the period, annual national government infrastructure spending rose 210% in absolute peso value, while the volume of Chinese steel imports surged by 1,042%.

On the private sector front, the Aquino administration also started bidding out PPP projects to tap private sector expertise in capital outlays, while keeping budget deficit in check. By the time President Aquino stepped down in June 2016, 12 projects worth PhP 292.3 billion had been awarded to private concessionaires (Magtulis, 2017). Some of these projects like the connector road from Daang-hari in Cavite to South Luzon Expressway, school buildings, and an airport expressway in Metro Manila had either been constructed or were being built at the time. There is no doubt that the ongoing private construction boom throughout the Aquino administration has also been a major contributor to the exponential increase in Chinese steel imports based on data used for the regression analysis; the growth rate in private construction from 2011 to 2016 was unprecedented at 13.7% annually.
Past experience of increases in Chinese steel imports during Aquino’s time suggest that significantly higher levels of importation are likely to result from increased public construction activity under the Duterte administration. Leveraging our empirical analysis, as well as NEDA estimates of the costs of implementing the government’s infrastructure plan from 2017-2022, we guesstimate that Chinese steel imports to the Philippines are poised to grow at an average annual rate of 17% from 2017 to 2022, reaching approximately 2.5 times their 2016 level (6.5 million metric tons) by 2022 (16.4 million metric tons).

Moreover, taking as a whole the PhP 8.44 trillion planned infrastructure package to be spent up to 2022, we expect that the country will require importing Chinese steel at a volume around ten times (1018%) as much as the annual 2016 levels. This will be the result of an estimated increase in steel shipments from 6.5 million metric tons in 2016 to 73 million metric tons in total for all public infrastructure projects under Duterte’s centerpiece economic program. Our estimates easily dwarf other government projections on future steel consumption, such as MGB estimates that the Philippines will need around the 20 million tons of steel annually for its economic activities by 2030 (Mines and Geosciences Bureau, 2016).6

Apart from red flags raised by Chinese dependency, potential high imports for the government’s infrastructure plans also carry risks from its possible impacts on the country’s external payments position. To date, government estimates have been limited to the project price tag. Yet there has been little effort, for instance, to quantify

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**Table 6. Potential effect of Build, Build, Build-related Spending on Chinese Steel Imports**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure Spending Amount (in million pesos)</td>
<td>847,220</td>
<td>1,169,550</td>
<td>1,359,050</td>
<td>1,407,200</td>
<td>1,668,000</td>
<td>1,896,770</td>
<td>8,430,880</td>
</tr>
<tr>
<td>Est. Effect on Imports (metric tons)</td>
<td>7,329,642.8</td>
<td>10,116,099.5</td>
<td>11,756,086.9</td>
<td>12,951,115.4</td>
<td>14,429,352.2</td>
<td>16,424,785.8</td>
<td>73,006,522.5</td>
</tr>
<tr>
<td>Annual Growth</td>
<td>12%</td>
<td>38%</td>
<td>18%</td>
<td>10%</td>
<td>11%</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Increase from 2016 Levels</td>
<td>12%</td>
<td>55%</td>
<td>80%</td>
<td>98%</td>
<td>121%</td>
<td>152%</td>
<td>1018%</td>
</tr>
</tbody>
</table>

*Source: Authors’ estimates, based on NEDA projections for government infrastructure spending from 2017-2022.*
how large imports would impact the Philippines’ balance of payments situation which measures capacity to generate enough resources to meet external obligations, including imports and foreign debts. This is despite early claims by economic managers that the peso’s depreciation against the dollar around mid-2017 has supposedly been a result of high capital imports in anticipation of the infrastructure program.

The peso’s drop has come with declining foreign reserves and an expected current account deficit equivalent to 0.2% of GDP by year-end (BSP, 2017). At the very least, government assurances that it will not repeat Ferdinand Marcos’ mistakes of debt-driven infrastructure development should also include keeping in mind that the economy continues to have strong buffers, even while the infrastructure plan is yet to take off (Chanco, 2017). All told, these open up another argument for developing the mining industry’s downstream sector to ensure local supply of at least some of the materials for industrialization and ultimately balance national security concerns with the availability of cheap imported steel from China. Clearly, there is much food for thought on the country’s already demonstrated import dependency, particularly when industrial policy and national security are intimately tied in the government’s own development vision and plan.

Viability of a Philippine Mineral Processing Industry

The foregoing raises the critically important need to assess the commercial and economic feasibility of developing processing capability for minerals in the Philippines. President Duterte himself emphasized this objective in his second State of the Nation Address in July 2017. We analyze the key factors here, and lay out some of the key issues for policymakers’ consideration.

Challenges to the Downstream Industry

The mining sector has been largely confined to mineral extraction with minimal processing for concentration of mineral values. This is shown in the shaded portions on Figure 5 from the MGB (2016). The rest of the chart shows supply gaps in the sector for corresponding end-uses.
During the first 100 days of the Duterte administration, MGB drafted a position paper that argued for the adoption of a mineral and metals-based industrialization program through the development of the downstream industry. In MGB’s view, a mineral industrial policy agenda is justified not only because of the strategic importance of minerals processing to long-term industrial and infrastructure development, but also due to increasing risks of disruptions to the global steel supply as a result of growing geopolitical conflicts, extreme weather events, resource nationalism, among others. In order to transition to the development of integrated iron and steel supply chains in the country by 2030, the agency recommended conducting feasibility studies for a 2.5-million ton per year ironmaking to primary steelmaking facility, as well as the adoption of complementary policies and programs in human resource development, transport and logistics, and zone development. The review of mining, export and incentive policies for nickel, iron, chrome, and manganese, and the revival of the Philippine Iron and Steel Authority were also endorsed (MGB, 2016).
Such policy proposals from the MGB ultimately stem from the fact that while mining operations have risen significantly in recent years, the number of processing plants and smelters in the Philippines has remained relatively static (See Table 7). Of the present four processors, two are processing gold, while the other two are processing nickel. The nickel processors are Taganito High Pressure Acid Leach (HPAL) Plant in Surigao del Norte, and Coral Bay HPAL Plant in Bataraza in Palawan.

![Table 7. Number of Operating Mines and Processing Facilities](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating Metallic Mines</th>
<th>Processing Plant/Smelter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>2005</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>2007</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>2008</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>2009</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>2011</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>2012</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>41</td>
<td>3</td>
</tr>
<tr>
<td>2014</td>
<td>43</td>
<td>5</td>
</tr>
<tr>
<td>2015</td>
<td>44</td>
<td>4</td>
</tr>
<tr>
<td>2016</td>
<td>41</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: MGB

The Chamber of Mines has cited many roadblocks to the development of the mineral downstream sector, including high power and business operating costs, poor infrastructure, government red tape, high domestic freight costs, environmental concerns, displacement of indigenous peoples and policy inconsistencies. Each has figured sporadically in the past few years. To begin with, high costs and unreliable power supply during the Ramos administration had tempered the window of opportunity for mineral investments that followed the signing of Republic Act (RA) 9742 or the Mining Act of 1995.
Former President Arroyo, meanwhile, attempted to address mining concerns and fast-tracked the issuance of land titles to indigenous peoples through Executive Order 270. R.A. 10668 or the Cabotage law, enacted in 2015, was legislated with the objective of lowering freight costs, but the Chamber of Mines has attested that the benefits have so far been minimal (personal communication, June 20, 2017). Under the Duterte administration, the appointment of environmentalist Gina Lopez as DENR secretary was quickly followed by the closure of 22 mines (Morales, 2017). While Lopez was subsequently rejected by the Commission on Appointments, the congressional body that evaluates presidential appointees, Duterte stepped up verbal attacks against mining firms, threatening to impose new taxes on them during his second State of the Nation Address in July 2017. Still, as already mentioned, Duterte, in the same speech, also called on foreign investors to establish factories in the Philippines and assist in industrialization. Notwithstanding mixed signals from government, it is critical to assess the prospects for integrating mining within the country’s broader industrialization plan, including, notably, the infrastructure push.

There were cases of success and failures in efforts to develop the downstream industry. On one hand, Lopez’s move to shutdown mines was cited by Nickel Asia when it suffered a drastic drop in revenues in 2016 compared to 2014 (Nickel Asia, 2016b). This added to problems created by low nickel prices that cut through its earnings. Earlier, when global nickel prices had slumped in 2015, Nickel Asia (2016a) divested some of its stake on Taganito HPAL Plant to Sumitomo Mining Corp., the Japanese majority stakeholder, leaving it with only 10% from its original 22.5% share. By 2016, the continued price drop dented the company’s nickel ore sales by as much as 42.5% from their 2014 levels. Upon being opened in 2014, however, the Taganito Plant had reported a decent income margin of 9.1% in its first year of operations (Nickel Asia 2015).

On the other hand, the Philippine Associated Smelting and Refinery Corp. (PASAR) operates the country’s lone copper smelter in Leyte with a capacity of 12,000 tons (BOI, 2017). Large operating costs forced the government to sell the mine in 2001 to Swiss firm, Glencore International, which now owns a 78% stake of PASAR. Even with a private operator, however, Recidoro argued that PASAR relies on imported copper from Chile to process despite the country’s “significant” 8 billion tons of copper ore reserves (Veloso, 2013, p. 7). Meanwhile, copper miners
ship their ores to Japan for processing. “There is disconnect and when we asked the miners why, they said PASAR charges higher than Japan for processing,” according to Recidoro (personal communication, June 20, 2017).

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Plant Category/Mill Type/End Product</th>
<th>Philippine Conversion Cost per MT (USD)</th>
<th>International Average Conversion Cost per MT (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap to Billet</td>
<td>B</td>
<td>80-100</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>100 or greater</td>
<td>75</td>
</tr>
<tr>
<td>Billet to Bars</td>
<td>Continuous, Category A</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Semi-Continuous, Category B</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Reversing, Category C</td>
<td>40</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Shape</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Cold Rolled Coils</td>
<td>Full hard</td>
<td>58</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Annealed and skin rolled</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tin-milled blackplate</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>GI Sheet / Strip Plants Producing Thin Gauge (0.2-0.4mm) mainly for roofing</td>
<td>Product mix of 80% full hard and 20% annealed (60-80 HBF)</td>
<td>70-80</td>
<td>60-65</td>
</tr>
<tr>
<td>Steel Strip to Pipes and Tubes, Black and Galvanized</td>
<td>Longitudinal welded types</td>
<td>135</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>Spiral welded</td>
<td>60-100</td>
<td>60-100</td>
</tr>
</tbody>
</table>


In March 2017, the government mulled mimicking Indonesia’s nickel ore export ban (See Box 2) to force companies to develop downstream technologies, instead of shipping their output to China and importing them back as finished materials (Agcaoili, 2017). While there has been no development on the plan after Lopez left DENR, Recidoro claimed that the policy would have only prompted many mining firms to “just close shop” instead of incurring high costs from local processing (personal communication, June 20, 2017). This underscores the reality that decisions to operate a processing facility largely depend on their financial viability, at least using a firm-level lens. This has to be distinguished from a national security
lens, which may involve some form of government support in order to help cover the firm-level hurdle rate for these types of investments.

For steel processing, Garcia & Vicente (2005), quoting a 2003 study by the Department of Science and Technology, discovered that conversion of the metal from low to high-value added products may cost between 7-30% more in the Philippines than global average, as shown in Table 8. By contrast, the only segment of the processing value chain in which the Philippines displayed competitive conversion costs relative to the international norm was in Category A of the billet to bars product category. Price changes have definitely been recorded since the study was first released, yet getting a clear sense of current price wedge between local and international prices has been challenging due to lack of data. Clearly, this is an area requiring further study, and one must acknowledge that the constraints the country faced in 2003 may not necessarily be relevant as it moves forward with its industrialization push.

In fact, the Department of Trade and Industry (DTI) has set a roadmap to expand the country’s local production of finished steel by 2030, enough for it to cover 70%

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**Box 2: Indonesia’s Ore Export Ban**

In January 2014, Indonesia implemented a 2009 law that prohibited the export of unprocessed minerals to force market players to consider investments in refineries and smelters. This, in turn, affected nearly half (49%) of Indonesia’s mineral output, a key revenue source for the government. Losses may have gone beyond that. According to USAID (2013, p. 2) analysis, accumulated revenue losses of miners would range from USD 33 billion to USD 34 billion by 2020, the year when all assumed processing capacity of the government is already operational. This would far outweigh a “modest” net welfare gain worth USD 832 million per year after 2020.

The policy was viewed poor and sweeping since it did not take into account minerals’ different characteristics and processing methods. Financial viability of developing smelters in Indonesia was also put into question given high capital costs, poor infrastructure and complexity in doing business. The agency suggested a more targeted approach that only considers developing downstream processes for minerals that would prove to be cost-efficient and profitable. Changes in the mineral tax regime were also suggested as a better approach to get the most out of the country’s natural resource endowments.
of our annual needs. While the roadmap did not take into account the impact of “Build, Build, Build”, the presence of a government plan indicates the feasibility of attracting investments to develop the mineral downstream sector. The plan targets to “insulate” the industry from “sharp swings in prices of primary steel products” by luring production investments by offering incentives through the government’s Investment Priorities Plan (Lignes, 2017, p. 16).

“The Blue Economy”:
Prospects for the Downstream Industry

Failure to develop the mineral downstream industry has forced the Philippines to rely on imports, which as far as industrial materials are concerned, have been largely sourced from China. Hence, broader positive externalities from more developed and integrated minerals, processing and manufacturing value chains have failed to materialize for the Philippines.

However, over the past few decades, the two countries’ territorial disputes have centered on minerals potentially held by islands in the South China Sea. But even without these islands, the Philippines is already endowed by natural resources which it can use for development purposes. The country occupies 70% of the “Coral Triangle,” which holds significant amount of marine biodiversity, including 600 different species of reef-building corals and 2,228 species of reef fish (Thomas, 2015). As of 2015, the government also identified 25 potential new natural gas resource around the archipelago which could complement, if not replace, natural gas coming from Malampaya oil fields which is seen to be depleted by 2030 (Saguin, 2015).

Malampaya currently supplies more than 30% of Luzon’s power. In addition, the Philippines also earned UN-recognized ownership over Benham Rise*, a 13-million-hectare underwater plateau located off the coast of Aurora province, which is believed to hold large natural gas deposits. The country’s geographical location and archipelagic state have likewise provided a locational advantage for the Philippines to attract shipbuilders. It is now the fourth largest shipbuilder in the world, next to South Korea, China and Japan (Invest Philippines, 2016). The government dangles tax incentives as well as cheap labor to lure major ship players to the country, which now include Keppel and Hanjin Heavy Industries.
A “selective” approach on the industrialization process, similar to suggestions by USAID (2013) to Indonesia, could work well for the Philippines. This would ensure targeted support interventions on specific programs that promise to be profitable, while shielding others from the blatant effects of a blanket policy like a nickel export ban. While the government has also emphasized the job-generating capacity of manufacturing, other industries may hold promise in creating value-adding economic activity, similar to, or more than that of manufacturing. The “smiling curve framework”, first proposed by Acer founder Stan Shih in 1992, argues that in a value-chain, product conception and marketing offer higher value-added than the middle of the process curve, including manufacturing (See Figure 6). When plotted, the y-axis represents the extent of value-added, and the x-axis as industrial process, showing the shape of a “smile.”

Indeed, there is scope for the Philippines to explore its industrial potential besides attracting factories. The country’s territorial waters have made it the tenth largest fishing destination, making investments to improve the quality and quantity of catch for food security purposes viable. Marine biotechnology is another area to be explored especially after a law for this purpose— R.A. 8435 or the Agriculture and Fisheries Modernization Act— was enacted. The law, among others, ensures government funding on biotechnology research. There have been some successes on this front. Anti-cancer drugs are being developed by the University of the Philippines (UP) Marine Science Institute from marine microorganisms found
only in the Philippines (Padilla-Concepcion, 2010). More recently, researchers at UP Los Baños have begun study on marine sponges and how they can be used to fight so-called antibiotic-resistant “superbugs” (Arado, 2017). In the long-term, development on these key fronts may spread economic activity beyond our traditional driver of consumption. In the process, this could help reduce Philippine import dependency, critical to national security.

Perhaps a common thread tying together the potential for all these sectors lies in the full development of the country’s ship-building and maritime transport sectors—the very same sectors that could serve as the lynchpin for developing the entire blue economy of the Philippines. Here, mining can play some role, to the extent that both mineral and energy output can serve as inputs in the value chain that links to these and many other sectors. Collective action that forms these value chains in a more deliberate manner can yield positive externalities such as opening the economic and commercial potential of many other industries (including the ones noted above) once the public and private sectors are able to fully secure access to the country’s maritime resources.

Perhaps it is worth exploring strategies—anchored on industrialization goals and national security objectives—to develop the country’s mineral processing industry. For one, mineral processors, similar to other manufacturing activity, are good absorbers of unskilled workers. With 38.6% or 15.54 million of the 40.28 million labor force employed by the informal sector as of April 2017, many Filipinos are at risk for not having social protection (Philippine Statistics Authority, 2017). Investing in industrial factories such as mineral processing facilities could assist the economy in creating a more productive labor force, while at the same time investing in their over-all wellbeing.

Simply put, this helps the Philippines gain from its much-touted “demographic dividend” where majority of the population is part of a young workforce aged 15 to 24 (Mapa, 2015). Not only does minerals processing allow for maximization of our labor resources, but more directly, it helps the country directly benefit from its own natural resources. While other activities in the smiling curve may create higher value-added economies of scale, no other activity aside from manufacturing presents an opportunity to directly create final products, such as nickel ores into steel for infrastructure development. Resource processing has been a key ingredient in the industrialization success of countries like South Korea and Australia (See Box
While indeed high power and business costs remain an issue, this is offset by a rich source of labor pool to manage factories which make them viable in the long run. This adds to state resources and incentives which may be channeled toward processing development.

Furthermore, even as these same countries may turn to imported inputs for manufacturing (e.g. Australia’s steel imports are projected to account for 28.8% of domestic demand by 2021), they began their industrial push with a much higher capability to process their own inputs (WTIA, 2016). This has at least two important benefits: stable and uninterrupted supply, as well as stronger domestic economic impact and technology upgrading from building fuller value chains. Hence, even as industrialized countries begin to turn to imported steel and other inputs, one must acknowledge that the initial industrial push likely relied more on domestic production and processing. Further research in this area can help clarify the possible strategies countries have taken to more effectively meld industrialization goals with national security interests.

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**Figure 7. Australia’s Iron and Steel Exports and Imports (1991-2015)**

To help illustrate these points, Figure 7 shows the partial evolution of steel trade in Australia. Even as Australia initially nurtured large domestic production capacity, eventually as the country fully industrialized, competitive pressures forced domestic firms to invest abroad and downstream industries were also forced to shift to imports. This, however, took place only later in its development trajectory.

An economy like the Philippines may lose out on important development opportunities if it skips lower-skilled industrial processes in favor of leapfrogging to higher-skilled activities. For years, manufacturing has been the missing link in

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**Box 3: Industrialization of South Korea and Australia**

South Korea and Australia present two successful cases of industrialization where the government and the private sector invested heavily on developing processing facilities.

According to Kim (1991), Korean industrial development was marked by three distinct sets of policies namely import substitution from 1954 to 1960, outward orientation from 1961 to 1979 and balance and stabilization in the 1980s. While import substitution in the 1960s was unsuccessful in the long run because of the economic imbalances it created, it helped develop the manufacturing sector, particularly textiles, garments and plywood. It eventually paved the way for more heavy industries in the 1970s, including steel mills, petrochemicals, non-ferrous metals and refined oil. Kim (1991, p.7) argued that “the government saw these sectors as the backbone of a modern industrial economy” that opened the doors to other vibrant industries today such as the shipbuilding, construction and automotive industries. Today, Korea ranks first in shipbuilding, while the Philippines is fourth. It is also home to Hyundai Motor, which operates the world’s largest integrated auto factory in Ulsan, Korea (Taylor, 2010) and Posco, the world’s fourth largest steel maker by output.

In Australia, the discovery of large iron ore reserves in the 1960s led to the development of the steel industry. The boom was aided by high prices as Japan sourced most of its industrial requirements from Australia. Large-scale mining investments in smelting followed from Africa (Australian Academy of Technological Sciences and Engineering, 1997). Australian firm BHP Billiton Ltd. owns seven of the biggest iron ore miners in the world (Basov, 2015), which develop high-grade ores into hematite and lump products. Australia also supplies China with iron for its own steel industry.

*Source: Authors’ synthesis based on various sources.*
the Philippine growth story marked by a large and generally poor agriculture sector and a service sector propelled by business process outsourcing (BPO) industry. The gap between the two suggests that high-skilled, foreign firm-driven BPO jobs are important, but not enough to develop a more inclusive and stable economy capable of protecting and harnessing our national security.

In addition, recent research has emphasized critically scarce resources—notably rare earth elements—which not only have high values, but could also serve as key inputs in developing sustainable industries (both green for terrestrial and blue for the maritime sectors). Cobalt, for example, is a key material used to produce advanced battery technology. Furthermore, scandium, which is potentially extracted from nickel laterite ores is an input in the production of high performance batteries and advanced aircraft (Arcilla 2017). Presently, Philippine exports of raw and unprocessed nickel ore to countries like China raise the risk that the country is missing out on extracting these rare earth elements.

**Conclusion**

The study examined the Philippine minerals industry’s potential to develop key industries, and in the process, contribute to securing the country’s sustainable economic development. It re-emphasized existing limitations in mineral processing and showed how over-reliance on key imports from China, one of the country’s major trading partners, could run counter to the objective of promoting national security. Beijing and Manila have been stuck in a longstanding territorial dispute in the South China Sea, and while the current Duterte government has seemingly repaired bilateral ties, it reveals new risks in its growing turn to China for infrastructure funds and key imported inputs. In this regard, this study showed the likely magnitude and extent of Chinese influence in the industrialization process through the Philippine government’s infrastructure agenda. At the rate of current mineral development, it showed that the Philippines would have to rely on potentially very large Chinese steel imports for its economic program—perhaps a ten-fold increase in Chinese steel imports—a scenario that brings with it major economic and political vulnerabilities.

In its own national security interest, the Philippines should consider pursuing mining downstream industry development, where, historically, the usual problems
of high costs from power to business, and bureaucratic inconsistencies, have proven to be a challenge. Yet, these are the very same challenges that the country is expected to overcome with reforms and its impending industrialization push which has already commenced.

The study showed that there still exist opportunities for the Philippines to cultivate these areas and benefit from its natural resources. Selecting key industries, such as shipbuilding, where it has most advantage on in terms of economic benefits and costs, will be beneficial for the economy. Public and private support given to these areas will go a long way creating high value-added products and services. Exploration of new territories, research and development could also assist in cultivating the country’s maritime industry. In the long term, opportunities for developing key Philippine industries remain high despite the challenges.

1 In 2012, President Benigno Aquino III issued Administrative Order No. 29 that renamed waters where the Philippines has claims from “South China Sea” to “West Philippine Sea.” For consistency with previous studies, the study uses the term “South China Sea” to refer to these waters.

2 In 2014, Canada ranked sixth in the world for investment in new domestic clean energy generation projects with five-year investments worth $31 billion (National Resources Canada, 2016-2017).

3 Data provided to authors by the Department of Budget and Management.

4 We turn to a basic ordinary least square regression model primarily to illustrate the empirical relationship. Without claiming any sophistication, we expect this will capture the magnitude of the expansion in imports effect we seek to estimate.

5 The analysis applied a static time-series regression on the basis that steel importation can be seen as largely contemporaneous with changes in construction, manufacturing and steel production activity (i.e. steel imports are largely converted into products by the construction and manufacturing sector within the same year). For proper disclosure purposes, we note that the possibility of autocorrelation in the regression has not been ruled out, with the Durbin-Watson test failing to prove or disprove the presence of autocorrelation at the 5% of significance, and the correlation coefficient between the residuals and their one-year lag being 0.09. Regressions with lagged variables, as well as with a time trend, were also conducted. With a time trend, the direction of estimated relationships for the coefficients of all variables remain the same, though the significance of the relationship of public construction and crude steel production are reduced to the 5% level, while that of the others are insignificant even at the 10% level. When lagged variables are used, no variables are estimated to have statistically significant coefficients.

6 It is important to note that this MGB estimate was made only within the first 100 days of the Duterte administration, and did not account for the possible impacts of the “Build, Build, Build” program on steel consumption and importation.

7 In May 2017, Duterte signed Executive Order No. 25 that renamed Benham Rise to “Philippine Rise,” shortly after Chinese surveillance ships were spotted in the area. In response, the Philippines deployed its own survey ships to ply the area regularly (Ranada, 2017).
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## Appendix A

### Data Used for the Regression Analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Chinese Steel Imports (kg)</th>
<th>Total Production of Crude Steel (metric tons)</th>
<th>Public Construction (Million Pesos, constant 2000 prices)</th>
<th>Private Construction (Million Pesos, constant 2000 prices)</th>
<th>Manufacturing Gross Value Added (Million Pesos, constant 2000 prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>157,115,049.00</td>
<td>680,000</td>
<td>120,657</td>
<td>241,101</td>
<td>816,494</td>
</tr>
<tr>
<td>1999</td>
<td>107,294,309.00</td>
<td>530,000</td>
<td>100,302</td>
<td>229,069</td>
<td>830,296</td>
</tr>
<tr>
<td>2000</td>
<td>135,125,419.00</td>
<td>420,000</td>
<td>111,156</td>
<td>229,644</td>
<td>876,107</td>
</tr>
<tr>
<td>2001</td>
<td>146,642,321.00</td>
<td>500,000</td>
<td>106,935</td>
<td>221,981</td>
<td>892,794</td>
</tr>
<tr>
<td>2002</td>
<td>181,504,403.00</td>
<td>550,000</td>
<td>83,770</td>
<td>237,108</td>
<td>927,102</td>
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<td>2003</td>
<td>232,028,302.00</td>
<td>500,000</td>
<td>83,420</td>
<td>250,322</td>
<td>961,264</td>
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<tr>
<td>2004</td>
<td>417,724,977.00</td>
<td>400,000</td>
<td>75,482</td>
<td>257,933</td>
<td>1,011,618</td>
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<td>2005</td>
<td>572,202,238.00</td>
<td>470,000</td>
<td>81,694</td>
<td>247,308</td>
<td>1,062,612</td>
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<tr>
<td>2006</td>
<td>873,262,407.00</td>
<td>550,000</td>
<td>112,443</td>
<td>241,945</td>
<td>1,106,062</td>
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<tr>
<td>2007</td>
<td>873,474,278.00</td>
<td>710,000</td>
<td>117,930</td>
<td>276,368</td>
<td>1,145,529</td>
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<td>2008</td>
<td>702,271,169.00</td>
<td>711,000</td>
<td>116,752</td>
<td>294,269</td>
<td>1,194,921</td>
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<tr>
<td>2009</td>
<td>355,070,277.00</td>
<td>624,000</td>
<td>135,563</td>
<td>279,128</td>
<td>1,137,634</td>
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<td>2010</td>
<td>571,364,694.00</td>
<td>1,060,000</td>
<td>144,247</td>
<td>346,413</td>
<td>1,264,623</td>
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<td>2011</td>
<td>699,259,398.00</td>
<td>1,200,000</td>
<td>88,267</td>
<td>362,079</td>
<td>1,324,330</td>
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<tr>
<td>2012</td>
<td>709,415,686.00</td>
<td>1,260,000</td>
<td>103,653</td>
<td>426,016</td>
<td>1,396,711</td>
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<tr>
<td>2013</td>
<td>969,076,369.00</td>
<td>1,500,000</td>
<td>122,143</td>
<td>460,666</td>
<td>1,538,912</td>
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<tr>
<td>2014</td>
<td>1,579,302,289.10</td>
<td>1,196,000</td>
<td>120,424</td>
<td>511,795</td>
<td>1,666,514</td>
</tr>
<tr>
<td>2016</td>
<td>4,528,144,245.68</td>
<td>965,000</td>
<td>151,161</td>
<td>550,641</td>
<td>1,790,989</td>
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<tr>
<td>2016</td>
<td>6,627,356,161.47</td>
<td>1,075,000</td>
<td>169,437</td>
<td>614,039</td>
<td>1,884,320</td>
</tr>
</tbody>
</table>
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